RE-EXAMINATION OF THE ZOEAL MORPHOLOGY OF
CHASMAGNATHUS GRANULATUS, CYCLOGRAPSUS LAVAUXI,
HEMIGRAPSUS SEXDENTATUS, AND H. CRENULATUS CONFIRMS
CONSISTENT CHAETOTAXY IN THE VARUNIDAE
(DECAPODA, BRACHYURA)

BY

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ABSTRACT

The morphology of first stage zoea larvae of four species of grapsoid crabs (viz., Chasmagnathus granulatus Dana, 1851, Cyclograpsus lavauxi H. Milne Edwards, 1853, Hemigrapsus crenulatus (H. Milne Edwards, 1837), and H. sexdentatus (H. Milne Edwards, 1837)) from Argentina and New Zealand was re-examined. Special attention was given to those characters that have been recently recognized to separate larvae of the families Sesarmidae and Varunidae. In all species studied, the setation of several appendages differed from that presented in the original descriptions of the larvae. The new chaetotaxy agrees well with expectations based on a recent taxonomic classification. The shared 2,2 setal pattern on the endopod of the maxilla and the same type of antenna and telson in all of these species, confirm a close phylogenetic relationship among them and their placement within the family Varunidae.

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INTRODUCTION

Over the last thirty years, many great larval morphologists had to realize that it was impossible to define morphological characters that would allow distinction of zoea larvae of the grapsid subfamilies Sesarminae and Varuninae (Wear, 1970; Rice, 1980; Wilson, 1980; Pereyra Lago, 1993a). Within the Sesarminae, two major groups of genera could be distinguished based on zoeal morphology. These two groups differed from each other in the setation pattern of several appendages (Wear, 1970; Rice, 1980; Wilson, 1980; Terada, 1982; Pereyra Lago, 1993a; Schubart & Cuesta, 1998). The zoeal chaetotaxy characterizing one of these groups (comprising the genera *Chasmagnathus*, *Cyclograpsus*, *Helice* s.l., *Helograpsus*, and *Metaplax*) showed striking similarity to the one found in most zoeae of the Varuninae (Cuesta, 1999; Cuesta et al., 2000). In a revision of larval morphology of American Sesarminae, Schubart & Cuesta (1998) emphasized the clear-cut differences between *Sesarma*, *Armases*, and *Aratus* on the one hand and *Cyclograpsus* and *Chasmagnathus* on the other, and suggested that the last two genera “should not remain within the Sesarminae, being much closer to species currently included in the subfamily Varuninae...” (Schubart & Cuesta 1998: 82). The need to shift several genera from the Sesarminae to the Varuninae was confirmed by subsequent molecular phylogenies of many grapsoid genera and additional evidence from adult morphological characters (Schubart et al., 2000; Schubart et al., in press). Furthermore, all former grapsid subfamilies were raised to family level to make taxonomy congruent with phylogenetic relationships to the Gecarcinidae as well as to some Ocypodoidea (Schubart et al., 2000; Schubart et al., 2002). One of the consequences of the reclassification of genera is, that it is now easy to establish diagnostic characters that define zoeae as well as megalopae of the Sesarmidae and Varunidae (see Cuesta, 1999; Cuesta et al., 2000).

In order to use larval morphology data for systematics, it is essential to rely on descriptions with accurate drawings and especially setal counts. In the past, optical instruments used for larval descriptions did not easily offer the same kind of resolution as modern instruments. Furthermore, exact numbers of setae did not appear as crucial as nowadays since the grouping of larvae based on their setation patterns was rather uncommon. Consequently, we find that many older descriptions of larvae lack the accuracy that we would like to see in modern ones (see Rice, 1979 and Clark et al., 1998 for standards). Larval descriptions with incorrect setal counts blur the picture that we may obtain from the evolution of larval appendages and make possible conclusions on phylogenetic relationships among taxa difficult. Recent re-examinations of larval material have helped to clarify setation patterns that seemed atypical for the taxonomic groups to which these taxa were ascribed (Fransozo et al., 1997; Schubart & Cuesta, 1998; Cuesta & Rodríguez, 2000).